

What is claimed is:

- 1     1.     An apparatus comprising:  
2             a despreader to despread data within a baseband code division multiple access  
3     (CDMA) signal, said data being associated with a desired user; and  
4             a despreading sequence generator to generate a joint equalization/multi-user  
5     detection (MUD) despreading sequence for use by said despreader to despread said  
6     data.
  
- 1     2.     The apparatus of claim 1, wherein:  
2             said despreading sequence generator treats active users as being within one of  
3     two groups, a first group for users whose signature sequences are assumed to be known  
4     to the apparatus and a second group for users whose signature sequences are assumed to  
5     be unknown to the apparatus.
  
- 1     3.     The apparatus of claim 2, wherein:  
2             said despreading sequence generator generates said joint equalization/MUD  
3     despreading sequence based on a quantity of users in said first group and a quantity of  
4     users in said second group.
  
- 1     4.     The apparatus of claim 2, wherein:  
2             said apparatus processes user signals associated with users in said first group  
3     using MUD-type processing and user signals associated with users in said second group  
4     using equalizer-type processing.
  
- 1     5.     The apparatus of claim 2, wherein:  
2             said apparatus behaves as a RAKE receiver when a quantity of users in said first  
3     group is 1 and a quantity of users in said second group is 0.

1     6.     The apparatus of claim 2, wherein:  
2             said apparatus behaves as a minimum mean square error (MMSE) equalizer  
3     when said first group includes only said desired user and said second group includes all  
4     other users associated with the same base station as said desired user.

1     7.     The apparatus of claim 2, wherein:  
2             said apparatus behaves as a multi-user detector (MUD) when said first group  
3     includes all active users and said second group includes no users.

1     8.     The apparatus of claim 2, wherein:  
2             active users are assigned to said first and second groups based on a  
3     predetermined assignment criterion.

1     9.     The apparatus of claim 8, wherein:  
2             said predetermined assignment criterion is user-definable.

1     10.    The apparatus of claim 8, wherein:  
2             said predetermined assignment criterion places users associated with a serving  
3     base station within said first group and users associated with other base stations within  
4     said second group.

1     11.    The apparatus of claim 8, wherein:  
2             said predetermined assignment criterion places users having stronger received  
3     signals within said first group and users having weaker received signals within said  
4     second group.

1     12.    The apparatus of claim 1, further comprising:  
2             a chip rate sampler to sample said baseband CDMA signal at a chip rate before  
3     said signal reaches said despreader.

1     13.     The apparatus of claim 1, further comprising:  
2             a channel decoder to decode an output of said despreaders.

1     14.     The apparatus of claim 13, further comprising:  
2             a feedback path from an output of said channel decoder to allow decoded  
3     information to be re-encoded, interleaved, and re-modulated for use in interference  
4     cancellation.

1     15.     A method for use in connection with a code division multiple access (CDMA)  
2     receiver, comprising:  
3             assigning individual active users to either a first group or a second group; and  
4             generating a joint minimum mean square error (MMSE) equalization and multi-  
5     user detection (MUD) despreading sequence based on a distribution of active users  
6     within said first and second groups.

1     16.     The method of claim 15, wherein:  
2             said first group includes users whose signature sequences are assumed known to  
3     a receiver and said second group includes users whose signature sequences are assumed  
4     unknown to the receiver.

1     17.     The method of claim 15, wherein:  
2             assigning individual active users includes assigning users based upon a  
3     predetermined assignment criterion.

1     18.     The method of claim 17, wherein:  
2             said predetermined assignment criterion is user definable.

1 19. The method of claim 15, wherein:  
2 assigning individual active users includes assigning users associated with a  
3 serving base station to said first group and assigning users associated with other base  
4 stations to said second group.

1 20. The method of claim 15, wherein:  
2 assigning individual active users includes assigning users to said first and  
3 second groups based on received signal strength.

1 21. The method of claim 15, further comprising:  
2 processing a received CDMA signal using said joint MMSE equalization and  
3 MUD despreading sequence.

1 22. The method of claim 21, wherein:  
2 processing includes performing RAKE receiver processing on said CDMA  
3 signal when said first group includes only a desired user and said second group includes  
4 no users.

1 23. The method of claim 21, wherein:  
2 processing includes performing MMSE MUD processing when said first group  
3 includes all active users and said second group includes no users.

1 24. The method of claim 21, wherein:  
2 processing includes performing MMSE equalization when said first group  
3 includes only said desired user and said second group includes all other active users  
4 associated with the same base station as said desired user.

1 25. The method of claim 21, wherein:  
2 processing includes performing a combination of MMSE equalization and  
3 MMSE MUD processing when both said first group and said second group include  
4 multiple users.

1 26. An article comprising a storage medium having instructions stored thereon that,  
2 when executed by a computing platform, result in:  
3 assigning, within a code division multiple access (CDMA) receiver, individual  
4 active users to either a first group or a second group; and  
5 generating a joint minimum mean square error (MMSE) equalization and multi-  
6 user detection (MUD) despreading sequence based on a distribution of active users  
7 within said first and second groups.

1 27. The article of claim 26, wherein:  
2 said first group includes users whose signature sequences are assumed known to  
3 the CDMA receiver and said second group includes users whose signature sequences  
4 are assumed unknown to the CDMA receiver.

1 28. The article of claim 26, wherein said instructions, when executed by said  
2 computing platform, further result in:  
3 processing a received CDMA signal using said joint MMSE equalization and  
4 MUD despreading sequence.

1 29. A system comprising:  
2 multiple receive antennas to receive a code division multiple access (CDMA)  
3 signal from a wireless channel;  
4 a despreader to despread data within a baseband version of said CDMA signal,  
5 said data being associated with a desired user; and  
6 a despreading sequence generator to generate a joint equalization/multi-user

7 detection (MUD) despreading sequence for use by said despreader to despread said  
8 data.

1 30. The system of claim 29, wherein:  
2 said despreading sequence generator treats active users as being within one of  
3 two groups, a first group for users whose signature sequences are assumed to be known  
4 to the system and a second group for users whose signature sequences are assumed to  
5 be unknown to the system.

1 31. The system of claim 29, wherein:  
2 said despreading sequence generator generates said joint equalization/MUD  
3 despreading sequence based on a quantity of users in said first group and a quantity of  
4 users in said second group.

1 32. The system of claim 29, wherein:  
2 said system processes user signals associated with said first group using MUD-  
3 type processing and user signals associated with users in said second group using  
4 equalizer-type processing.

1 33. The system of claim 29, further comprising:  
2 a chip rate sampler to sample said baseband version of said CDMA signal at a  
3 chip rate before it reaches said despreader.

1 34. A method comprising:  
2 receiving a code division multiple access (CDMA) signal from a wireless  
3 channel; and  
4 detecting user data within said CDMA signal, wherein detecting user data  
5 includes processing said CDMA signal using a combination of minimum mean square  
6 error (MMSE) equalization and MMSE multi-user detection (MUD) techniques.

1    35.    The method of claim 34, wherein:  
2           processing said CDMA signal includes:  
3                 obtaining a joint MMSE equalization and multi-user detection (MUD)  
4           despreading sequence; and  
5                 despreading said user data within said CDMA signal using said joint  
6           MMSE equalization and MUD despreading sequence.

1    36.    The method of claim 35, comprising:  
2           channel decoding said user data after said despreading to generate decoded data;  
3    and  
4           using at least some of said decoded data to perform interference cancellation.

1    37.    The method of claim 34, comprising:  
2           converting said CDMA signal from a radio frequency (RF) representation to a  
3    baseband representation before said processing.

1    38.    The method of claim 37, comprising:  
2           sampling said baseband representation of said CDMA signal at a chip rate  
3    before said processing.